

Broadband Super Thunderbird

**Model TH-7DX
Instruction Manual**



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CHAPTER 4

General

The Hy-Gain TH7DX is a 7 element, 3 band beam antenna designed for broadband, high performance operation on the Amateur 10, 15, and 20 meter bands. Broadbanding is accomplished through the use of two fully trapped driven elements. Stainless steel hardware and clamps are used on all electrical connections.

Hy-Gain's 50 ohm BN-86 balun and preformed feed straps are supplied. The TH7DX also comes with a wire boom support for additional strength. The antenna is designed to fit masts from 2" to 2 1/2" in diameter and can be rotated with HyGains's HDR-300/A, Ham IV or T2X rotators.

Specifications

Electrical

Frequencies of Operation.....	20m.....	15m.....	10m.....
Under 2:1 VSWR (MHz).....	14.0-14.35.....	21.0-21.45.....	28.0-29.7.....
Under 1.5:1 VSWR (MHz).....	14.07-14.33.....	21.18-21.45.....	28.6-29.6.....
Front-to-Back Ratio (dB).....	22 ± 5.....	22 ± 5.....	18 ± 5.....
Average Half-Power			
Beamwidth (deg).....	66.....	63.....	66.....
Maximum Gain (dBi).....	8.0.....	8.7.....	9.6.....
Maximum Power.....		Maximum Legal.....	
Lightning Protection.....		DC Ground.....	

Mechanical

Boom Length.....	24 feet (7.32 m) (guy support supplied)
Boom Diameter.....	2 inches (5.1 cm)
Longest Element.....	31 feet (9.45 m)
Longest Driven Element (one-half total length).....	20 m - .185 wavelength 15 m - .203 wavelength 10 m - .225 wavelength
Turning Radius.....	20 feet (6.10 m)
Accepts Mast.....	2" to 2 1/2" O.D. (5.1 cm to 6.4 cm)
Net Weight.....	75 lbs. (34.0 kg)
Maximum Wind Survival.....	100 mph (161.0 kmph)
Effective Wind Area.....	9.4 sq. ft. (0.87 m2)
• Effective Moment.....	1500 ft. lb. (207 Kg. m)
Wind Load at 80 mph.....	240 lbs. (108.8 kg)
Element Tubing Clamps.....	All stainless steel
Hardware.....	All stainless steel
Suitable Rotators.....	Hy-Gain HDR-300/A, Ham IV or T ² X
*Projected Area (elements).....	12.1 sq. ft. (1.12 sq. m.)
(boom).....	4.1 sq. ft. (0.38 sq. m.)

• Effective moment is defined as the product of antenna weight and turning radius, and can be used to select a compatible rotator.

*Projected Area is the actual (flat) projected area of either the elements or boom (highest value) without any shape factor included. this area may be used with EIA/TIA-222-D and later versions and with the UBC formulas to determine tower and mast loading. On HF beams, the element area is usually higher. On VHF/UHF beams, the boom area is usually higher. When stacking HF and VHF beams, use the element area of all beams at their attachment points to determine loading at zero

CHAPTER

Preparation for

FOR OUR OVERSEAS CUSTOMERS: The United States uses American units of measurement. Please see page 7-2 of this manual for assistance in identifying the hardware and components supplied with this product.

Choose a large, clear area to assemble the TH7DX. The area must be at least 24'x 31' (7.3 m x 9.5 m). You may wish to use sawhorses or chairs to support the boom during assembly. A concrete driveway is an excellent area for assembly. If you assemble this antenna over a grassy area, precautions should be taken so that hardware is not accidentally lost during assembly.

TOOLS: The following tools are required for easy assembly of the TH7DX.

Type Tool	Qty
Tape Measure, 12 foot	1
Adjustable Wrench, 8 inch	2
Nut Driver, 7/16"	1
Nut Driver, 3/8"	1
Nut Driver, 5/16"	1

When unpacking your antenna, check inside of all tubing (traps, smaller tubing, etc.). To conserve space, these smaller articles are sometimes put inside larger pieces. Check all parts against the parts list to make sure no parts are missing. The hardware supplied with this antenna is bagged by thread size for your

All tubing supplied with the TH7DX telescopes together. Make all measurements to the given dimensions, plus or minus, no more than 1/8 inch.

The TH7DX is a highly sophisticated and complex array consisting of more than 700 parts. The superb performance engineered into this array is totally dependent on accurate assembly. All components and hardware must be used as directed in the instruction manual. The key to success is to allow yourself plenty of time.

We suggest that the assembly be done over a 2-day period. We further suggest that you read this manual thoroughly, in its entirety, then go through the manual the second time and identify and familiarize yourself with all of the antenna components, and then start assembling the antenna. A few hours invested in the assembly process will insure many years of satisfaction with the TH7DX.

NOTE: An extra Figure 6, Overall View - Element Assembly and Antenna Dimensions, has been inserted in this manual for use when assembling the antenna.

NOTE: Refer to the maintenance section on page 5-2 for information on using anti-oxidants and other methods of obtaining longer product life.

CHAPTER

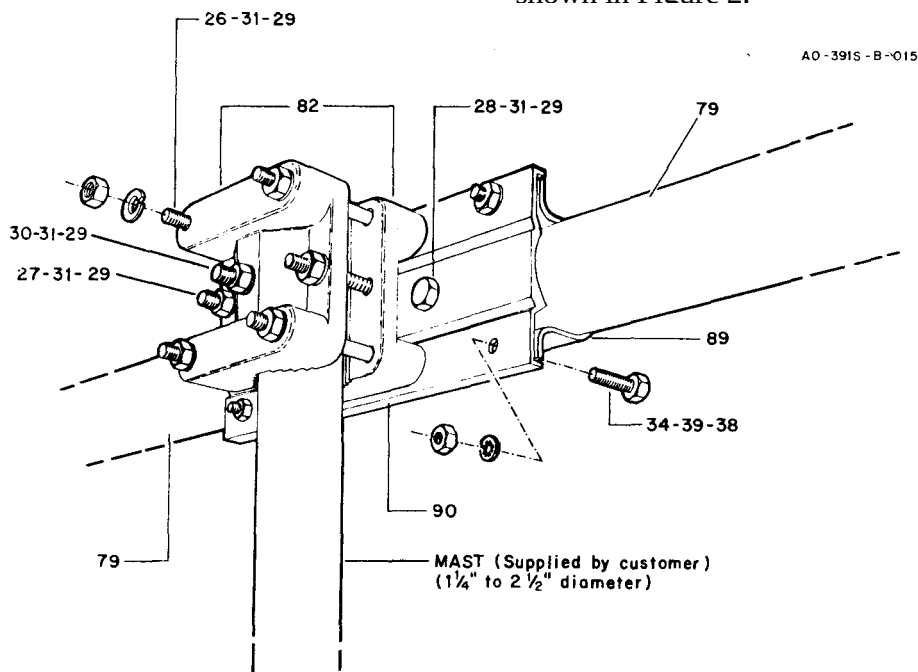
Assembly of the Boom-to-Mast Brackets and Boom

Select the boom-to-bracket clamp parts (Item Nos. 89 & 90). Loosely assemble them on the boom ends (Item No. 79), as shown in Figure 1. Line up the holes on both brackets and both boom ends. Secure the two brackets together with four (4) 1/4"-20 x 3/4" bolts, lockwashers and nuts (Item Nos. 34, 39 & 38). Secure the brackets to the two boom ends using the 5/16"-18 x 2 3/4" bolts, lockwashers and nuts (Item Nos. 28, 31 & 29). Tighten these six bolts securely.

NOTE: The use of heavy motor oil on stainless steel threads will prevent galling of threads.

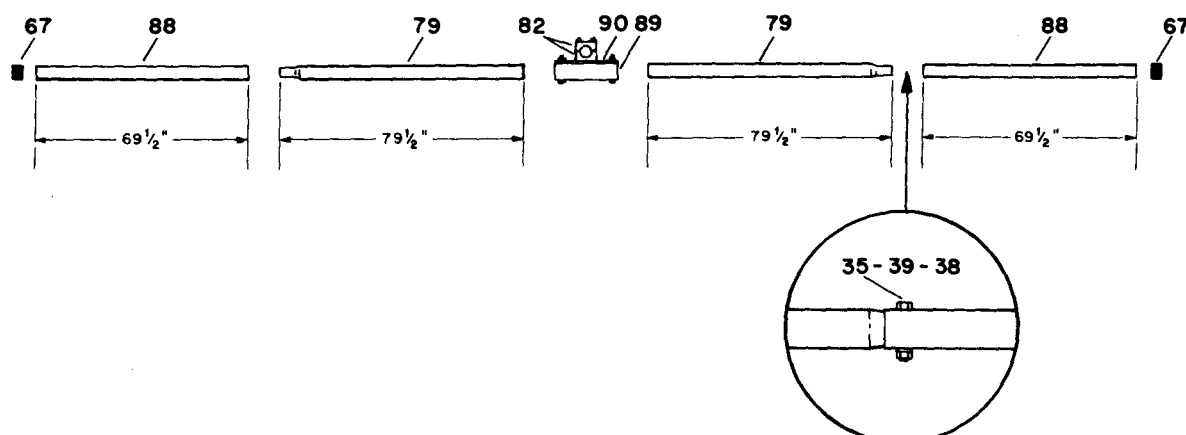
Assemble the two cast aluminum brackets (Item No. 82) on the mast at the desired height above your tower. Secure the two brackets together using the two (2) 5/16"-18 x 3 " bolts, lockwashers and nuts (Item Nos. 27,31 & 29). You may wish to drill a 5/16" hole through the cast brackets' center hole and through the mast and secure using a 5/16"-18 x 3 3/4" bolt, lockwasher, and nut (Item Nos. 30, 31 & 29). This bolt will prevent the antenna from twisting on the mast in high winds. See Figure 1. The four (4) 5 inch bolts will be installed when the antenna is installed on the mast.

Slip the two remaining boom sections (Item No. 88) over the two swaged ends of the assembled boom and secure using a 1/4"-20 x 2 1/2" bolt, lockwasher and nut (Item Nos. 35, 39 & 38), as shown in Figure 2.



Item No.	Description	Item No.	Description
26	Bolt, hex head, 5/16"-18 x 3"	38	Nut, hex, 1/4"--20
27	Bolt, hex head, 5/16"-18 x 2 3/4"	39	Lockwasher, internal,
28	Nut, hex, 5/16"-18	79	Tube, Boom, 2" x 79 1/2"
29	Bolt, hex head, 5/16"-18 x 3 3/4"	82	Mast Bracket, cast
30	Lockwasher, split, 5/16"	89	Clamp, Boom-to-Bracket
31	Bolt, hex head, 1/4"-20 x 3/4"	90	Bracket, Casting-to-

Figure 1 Boom-to-Mast Bracket



Item No.	Description	Item No.	Description
35	Bolt, hex head, 1/4"-20 x 2 1/2"	82	Mast Bracket, cast aluminum
38	Nut, hex, 1/4"-20	88	Tube, Boom, 2" x 69 1/2"
39	Lockwasher, internal, 1/4"	89	Clamp, Boom-to-Bracket
67	Caplug, 2"	90	Bracket, Casting-to-Boom
79	Tube, Boom, 2" x 79 1/2"		

Figure 2
Assembly of Boom

Assembly of the Elements-to-Boom Brackets on the Boom

Front Driven

Select one pair of the largest element-to-boom brackets (Item No. 85). These are marked with a number 14. Assemble the brackets on the boom 20 inches to the left of the mast bracket (center-to-center). The curved side of the mast bracket must be facing you. Refer to Figure 3 for identification of hardware. **DO NOT**

Rear Driven

Select another pair of the largest element-to-boom brackets (Item No. 85). Assemble these brackets on the boom 35 inches to the right of the center of the mast bracket. Refer to Figure 3. **DO NOT** tighten the bolts at this time.

10-Meter Reflector:

Select a pair of the smallest element-to-boom brackets (Item No. 83). These are marked with a number 4. Assemble these brackets on the boom 58 1/2 inches to the right of the rear driven element brackets. Refer to Figure 3 and 6. **DO NOT** tighten

10-Meter Director.

Select another pair of the smallest element-to-boom bracket (Item No. 83). Assemble these 44 1/2 inches to the left of the front driven element brackets. Refer to Figures 3 and 6. **DO NOT** tighten at this time.

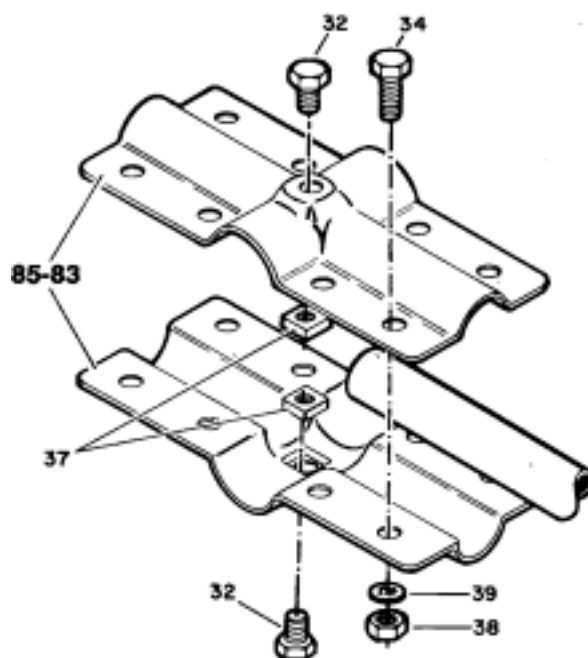
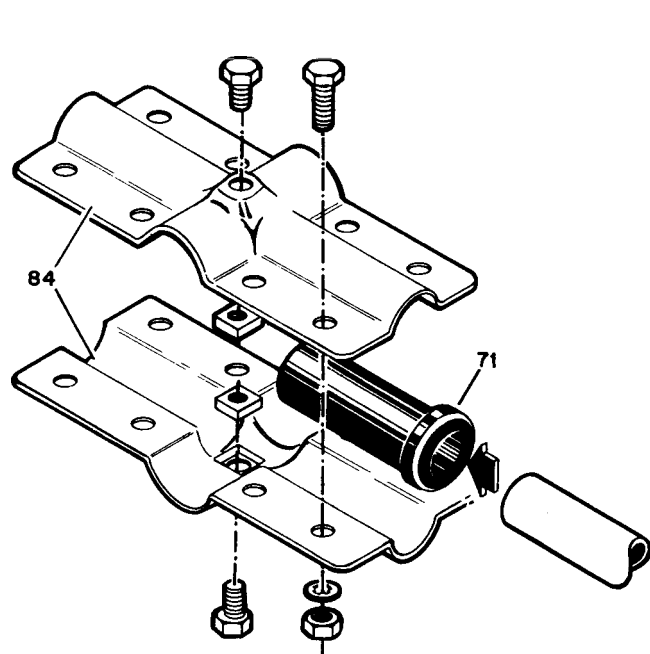
15-Meter

Select another pair of the smallest element-to-boom brackets (Item No. 83). Assemble these 37 1/2 inches to the left of the 10-meter director brackets. Refer to Figures 3 and 6. DO NOT tighten at this time.

10-20 Director and 15-20

Select two sets of medium sized element-to-boom brackets (Item No. 84) and loosely assemble these on the boom ends. The front set should be 39 1/2 inches to the left of the 15-meter director brackets. The rear set should be 48 inches to the right of the 10-meter reflector brackets. Refer to Figures 3 and 6. DO NOT tighten now.

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Item No.	Description
32	Bolt, hex head, 1/4"-20 x 3/8"
34	Bolt, hex head, 1/4"-20 x 3/4"
37	Nut, square, 1/4"-20
38	Nut, hex, 1/4"-20

Item No.	Description
39	Lockwasher, internal, 1/4"
71	Insulator, Driven Element
83	Bracket, Element-to-Boom, #4
84	Bracket, Element-to-Boom, #13
85	Bracket, Element-to-Boom, #14

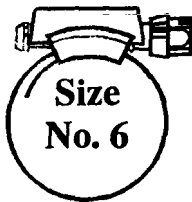
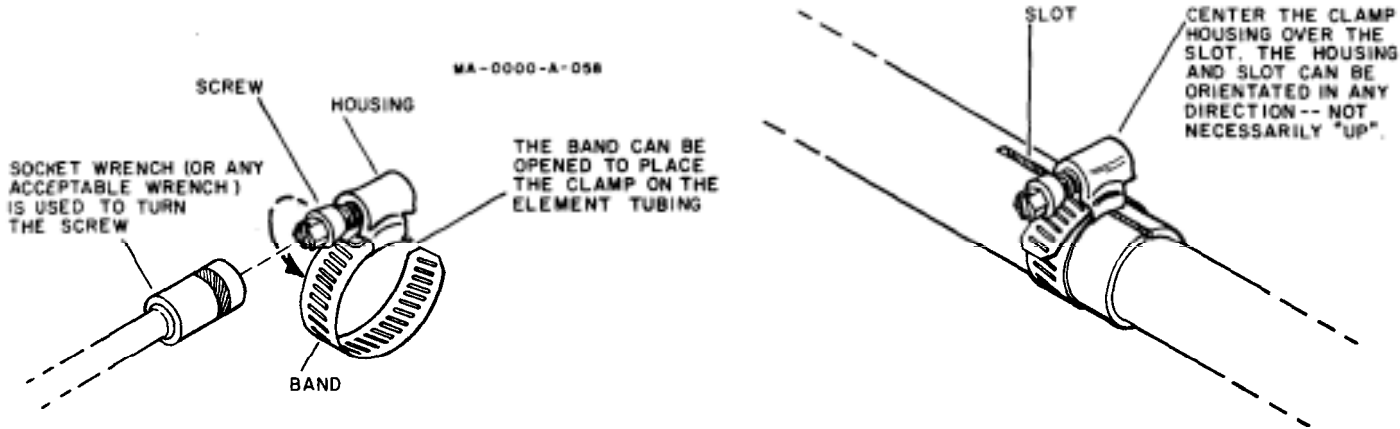
Figure 3 Element-to-Boom Brackets

Remove the top anchor bolt from the 10-meter director bracket. The beta tubes will be installed over this bracket in a later step.

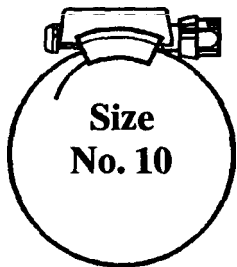
Installation of Tubing Clamps

Select the proper size tubing clamp as shown in the chart. When installing the clamps, place the clamp near the tube end with the top of the clamp over the slot in the tube as shown in Figure 4.

After adjustment of the tubing lengths, tighten the clamp with a 5/16 inch nut driver, socket, or open end wrench until the tubing will not twist or telescope. DO NOT overtighten!



Part No.	Description	Fits Tubing Sizes
358756	Clamp, Size #6 all stainless steel 5/16" hex head screw	1/2 and 3/4"



Part No.	Description	Fits Tubing Sizes
358757	Clamp, Size #10 all stainless steel 5/16 hex head screw	1"



Part No.	Description	Fits Tubing Sizes
358758	Clamp, Size #16 all stainless steel 5/16 hex head screw	1 1/4"

Figure 4
Tubing Clamps

Element Assembly

To take advantage of the broadband nature of the TH7DX, use the supplied dimensions as shown in Figure 6. If assembled correctly, the VSWR will be below 2:1 on any frequency on these 3 bands. However, if you wish to optimize the TH7DX for the DX portions of these 3 bands, use the following "DX setting" for the RDE-2 and FDE-2 dimensions:

RDE-2 = 33" (83.8 cm)

FDE-2 = 42" (106.7

The DX setting will result in minimum VSWR at 14.150, 21.260 and 29.000 MHz. However, VSWR near 14.350 and 29.700 may be slightly above 2:1. The front-to-back ratio and gain will not change.

The following steps will be in singular form. Do each element assembly step, first for one side of the boom and then for the other side. The dimensions shown in Figure 6 are in English units on the right side and metric on the left side. After each element is assembled to the boom, tighten the eight (8) 1/4"-20 x 3/4" bolts (Item No. 34). After all elements are assembled, make sure that they all lie in a horizontal plane, then tighten the anchor bolt

Front Driven

Select the FDE-1 section (1 1/4" x 35") and a driven element insulator (see Figure 3). Slip the DE insulator on the unslotted end of the FDE1, then slip the insulated end of the FDE-1 into the bracket which is 20 inches to the left of the mast bracket. Tighten the eight (8) bolts to hold the element in place.

Install a No. 16 tubing clamp on the slotted end of the FDE-1 and insert the unslotted end of the FDE-2 (11/8" x 48") to the dimension shown in Figure 6. Tighten the No. 16 tubing clamp securely and recheck the FDE-2

Assemble the remainder of the Front Driven Element in the same manner using dimensions from Figure 6. Use Figure 5 and Detail A as guides.

Use 10-meter trap, Part Number 878749, and 15 meter trap, Part Number 878637, in this assembly. Make sure all insulators and trap caps are firmly seated.

NOTE: The drain holes and slots should be facing the ground and the trap labels should be on the boom side of the trap. Also, on all tubing attached to traps, make sure all slots are facing the ground and the small drain holes are aligned with the slots. See Figure 5.

Rear Driven Element

Select the RDE-2 section (1 1/4" x 48") and a driven element insulator. Slip the DE insulator on the unslotted end of the RDE-1, then slip the insulated end of the RDE-1 into the bracket which is 35 inches to the right of the mast bracket. Make sure the insulator seats completely onto the tube and into the bracket. Tighten the eight (8) bolts to hold the

Install a No. 16 tubing clamp on the slotted end of the RDE-1 and insert the unslotted end of the DRE-2 (11/8" x 36") to the dimension shown in Figure 6. Tighten the No. 16 tubing clamp securely and recheck the RDE-2 dimension. Assemble the remainder of the Rear Driven Element in the same manner using dimensions from Figure 6. Use Figure 5 and Detail A as guides. Use the same traps as on the Front Driven Element.

10-Meter Reflector Element

Select the R2-1 section (7/8" x 55") and slip the unswaged end of the R2-1 completely into the bracket (Item No. 83) assembled on the boom 58 1/2" inches to the right of the RDE. Tighten the eight (8) bolts to hold the element onto the boom

Assemble the remainder of the 10-meter reflector as shown in Figure 6 using No. 6 tubing clamps. Tighten all element tubing clamps with the slots facing the ground and recheck all dimensions.

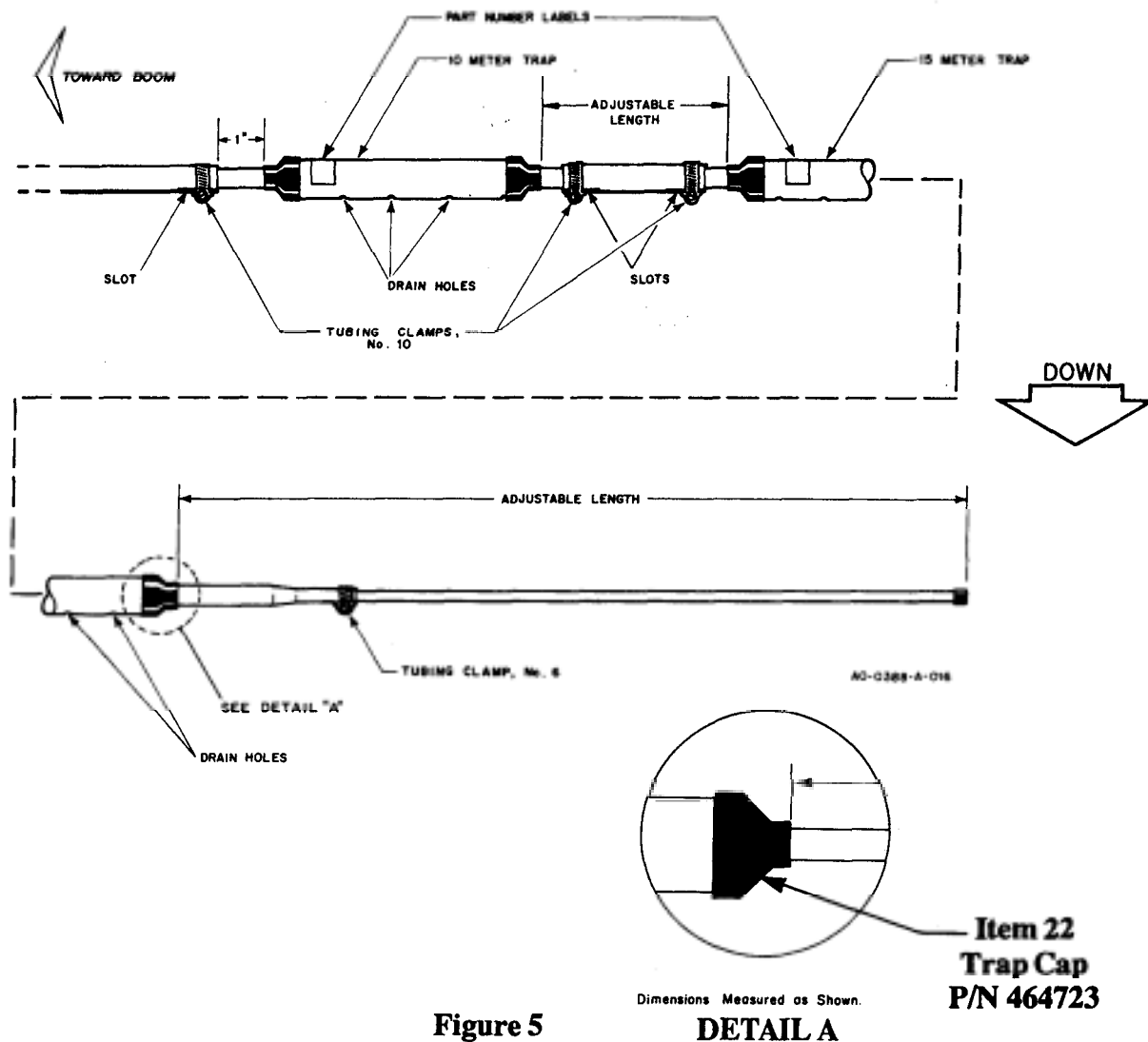


Figure 5
Trap Detail

15-20 Meter Reflector Element

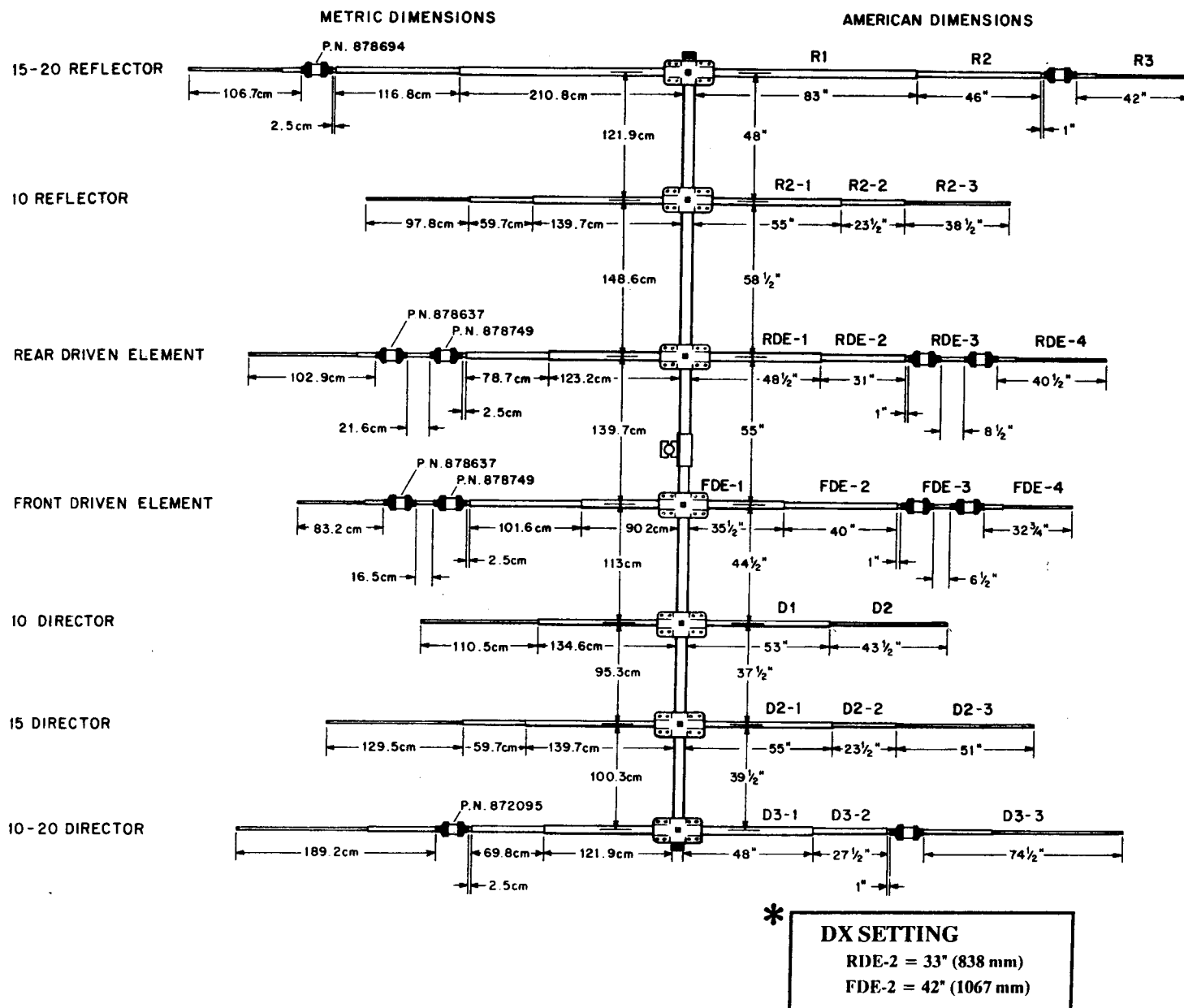
Select the R-1 section (11/4" x 83") and slip the unslotted end completely into the bracket (Item No. 84) assembled on the boom 48 inches to the right of the 10-meter reflector. Tighten the eight (8) bolts to hold the element onto the boom.

Assemble the remainder of the 15-20 meter reflector as shown in Figure 6 using No. 16, 10, and 6 tubing clamps. Use 15-meter trap, Part Number 878694, and install with the drain holes facing the ground. Use Figure 5 and Detail A as guides. Tighten all element tubing clamps and recheck all dimensions.

10-Meter Director Element

Select the D 1 section (7/8"x53") and slip the unswaged end of the D1 completely into the bracket (Item No. 83) assembled on the boom 44 1/2 inches to the left of the Front Driven Element. Tighten the eight (8) bolts to hold the element onto the boom.

Assemble the remainder of the 10-meter director, as shown in Figure 6 using No. 6 tubing clamps. Tighten all element tubing clamps with the slots facing the ground and recheck all dimensions.



Item No.	Designator	Part Number	Description	Item No.	Designator	Part Number	Description
1	R1	871098	11/4" x 83"	12	FDE-3	190606	1"x6"
2	R2	190303	11/8" x 52"	13	FDE-4	178558	7/16" x 28"
3	R3 & RDE-4	171153	7/16" x 37"	14	D1	174861	7/8" x 53"
4	R2-1 & D2-1	190206	7/8" x 55"	15	D2	174865	7/16" x 48"
5	R2-2 & D2-2	190006	5/8" x 26"	16	D2-3 & D3-3	175165	7/16" x 52"
6	R2-3	175512	7/16" x 42 3/4"	17	D3-2	190312	11/8" x 317/8"
7	RDE-1 & D3-1	190900	11/4" x 48"	18	15-Meter Trap	878694	15-Meter Trap
8	RDE-2	190311	11/8" x 36"	19	10-Meter Trap	878749	10-Meter Trap
9	RDE-3	190603	1" x 8"	20	15-Meter DE Trap	878637	15-Meter DE Trap
10	FDE-1	190908	11/4" x 35"	21	10-Meter Dir. Trap	872095	10-Meter Dir. Trap
11	FDE-2	190300	11/8" x 48"				

Figure 6 Overall View - Element Assembly and Antenna Dimensions

15-Meter Director Element

Select the D2-1 section (7/8" x 55") and slip the unswaged end of the D2-1 completely into the bracket (Item No. 83) assembled on the boom 37 1/2" inches to the left of the 10-meter director. Tighten the eight (8) bolts to hold the element onto the boom.

Assemble the remainder of the 15-meter director as shown in Figure 6 using No. 6 tubing clamps. Tighten all element tubing clamps with the slots facing the ground and recheck all dimensions.

10-20 Meter Director Element

Select the D3-1 section (1 1/4" x 48") and slip the unslotted end completely into the bracket (Item No. 84) assembled on the boom 39 1/2 inches to the left of the 15-meter director. Tighten the eight (8) bolts to hold the element onto the boom.

Assemble the remainder of the 10-20 meter director as shown in Figure 6 using No. 16, 10, and 6 clamps. Use 10-meter director director trap, Part Number 872095, and install with the drain holes facing the ground. Use Figure 5 and Detail A as guides. Tighten all element tubing clamps and recheck

Final Element Assembly

After all elements have been installed, align all elements in the horizontal plane and tighten all anchor bolts. You may wish to temporarily assemble the entire boom-to-mast assembly with a short length of mast material to ensure that all elements are assembled perpendicular (at 90 degrees) to the mast. Select the dampener rope and cut it into six equal lengths of two feet each. Slip a rope into the end of each monoband element. With about a 1/2" of rope extending from the element end, separate the fibers and fold them back over the element end. Refer to Figure 7. Now slip a 7/16" caplug over the element and rope. The rope inside the

Place a 7/16" caplug on each end of the trapped elements, also. Select the 2" caplugs and place one on each boom end. Check all element spacings and dimensions and tighten all the bolts before continuing.

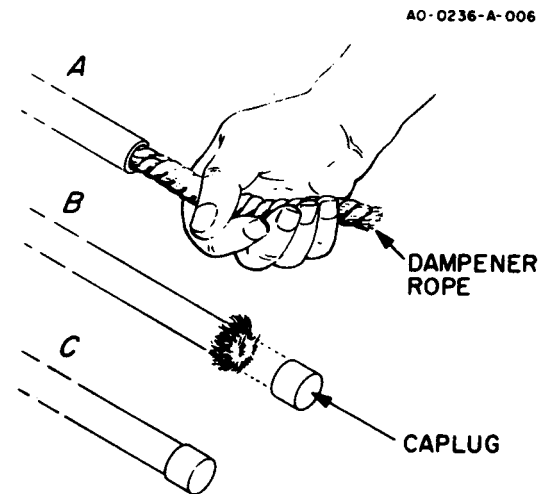


Figure 7
Rope Dampener

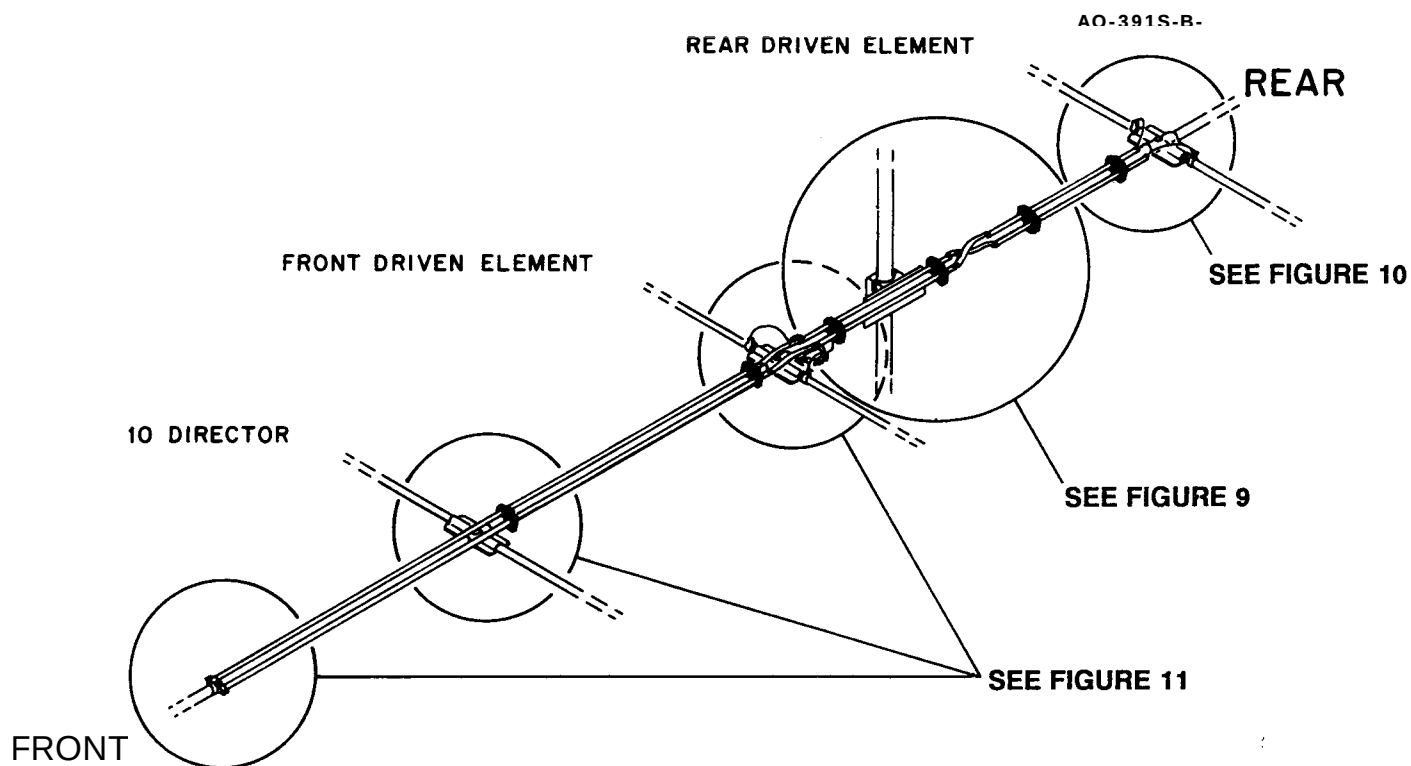


Figure 8 Overall View of Beta Match and Phasing Tubes

Phasing Line Assembly

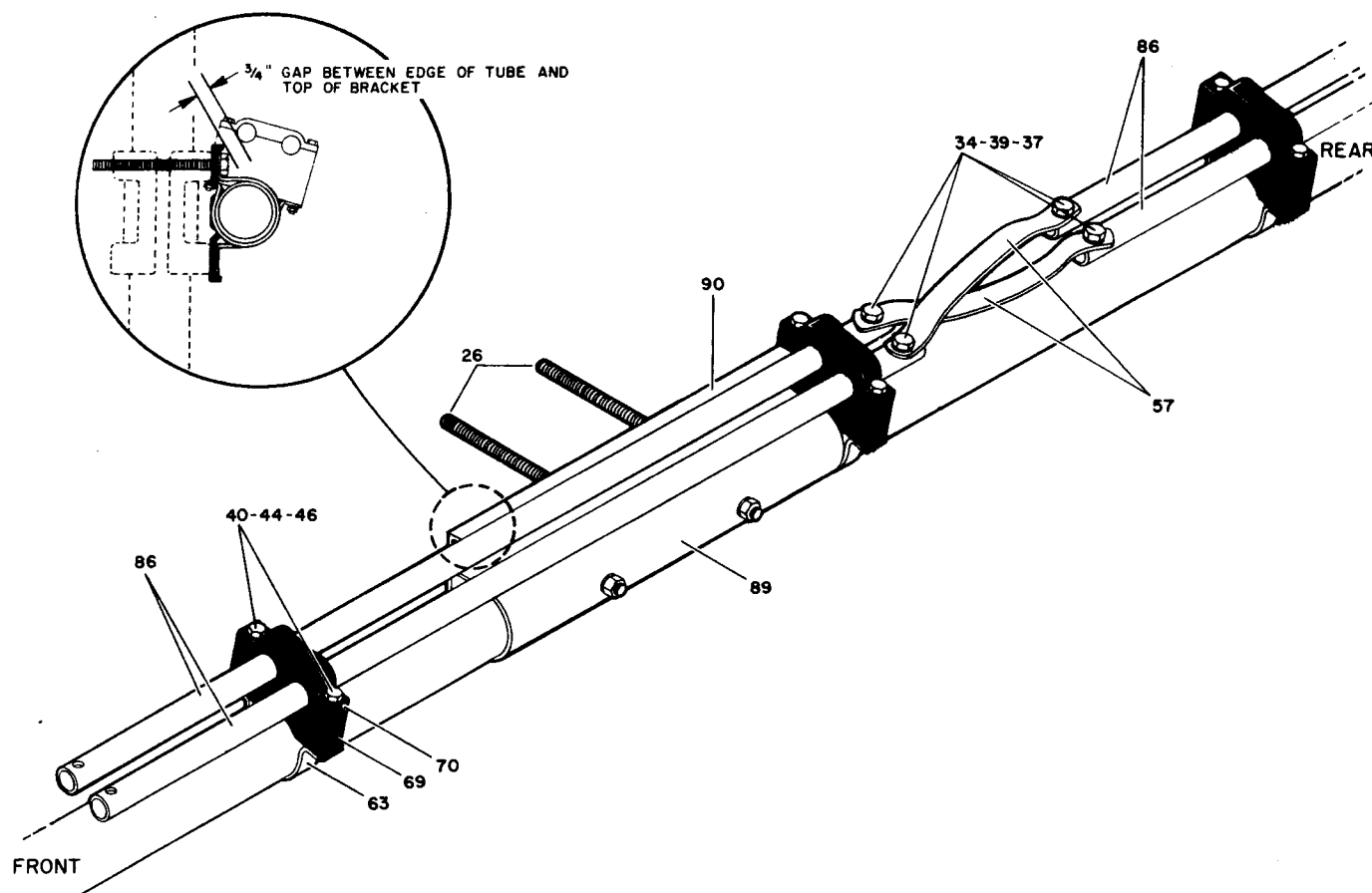
Select the four (4) $\frac{3}{4}$ " x 23" phasing tubes (Item No. 86), two (2) crossover straps (Item No. 57), four (4) beta support clamps (Item No. 63), four (4) beta support insulators (Item No. 69), four (4) beta top insulators (Item No. 70), and associated hardware as shown in Figure 9. Assemble the rear pair of phasing tubes to the boom as shown in Figures 9 and 10. Position the rear ends of the $\frac{3}{4}$ " x 23" tubes $21\frac{1}{2}$ inches from the center of the RDE bracket. Position the tubes so that the drilled holes are away from the boom. Rotate this assembly on the boom so that the front set of phasing tubes will just clear the mast bracket. Tighten the four (4) # 10-24 x 2" bolts, which

Select the two crossovers straps and install on the previously installed phasing tubes with $\frac{1}{4}$ "20 x $\frac{3}{4}$ " bolts, lockwashers and square nuts. DO NOT tighten completely at this time. See Figure 9.

Select the remaining two (2) phasing tubes, two (2) beta support clamps, two (2) beta support insulators, two (2) beta top insulators, and associated hardware as shown in Figure 9. Assemble the front pair of phasing tubes to the boom as shown in Figure 9. Rotate the tubes so that the drilled holes are away from the boom. Slide the assembly on the boom until the crossover straps can be attached. The ends of the phasing tubes should be about $3\frac{1}{8}$ inches apart. Attach the crossover straps to the front phasing tubes and tighten the $\frac{1}{4}$ "-20 x $\frac{3}{4}$ " bolts at this time. Loosen and rotate the two assemblies on the boom and install the top two mast bracket bolts ($\frac{5}{16}$ " - 18 x 5") as shown in Figure 9. Rotate the two assemblies back into place and position them so that the phasing tubes are $\frac{3}{4}$ inch from the top flange of the mast bracket. You should be able to insert your fingers between the phasing tube and mast bracket and run them along the phasing tube. Tighten the # 10 - 24 x 2" bolts which hold the assemblies to the boom.

Select two (2) 1 1/4" aluminum tubing clamps, two (2) 7" pigtail assemblies and associated hardware as shown in Figure 10. Install as shown and tighten all bolts securely.

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Item No.	Description	Item No.	Description
26	Bolt, hex head, 5/16" - 18 x 5"	57	Crossover Strap, TH7DX
34	Bolt, hex head, 1/4" - 20 x 3/4"	63	Clamp, Beta Support
37	Nut, square, 1/4"- 20	69	Insulator, Beta Support (Bottom)
39	Lockwasher, internal, 1/4"	70	Insulator, Beta Support (Top)
40	Bolt, hex head, # 10 "	86	Phasing Tubes, 3/4" x 23"
44	Nut, hex, # 10 - 24	89	Clamp, Boom-to-Bracket
46	Lockwasher, internal, # 10	90	Bracket, Casting-to-Boom

Figure 9
Crossover Strans

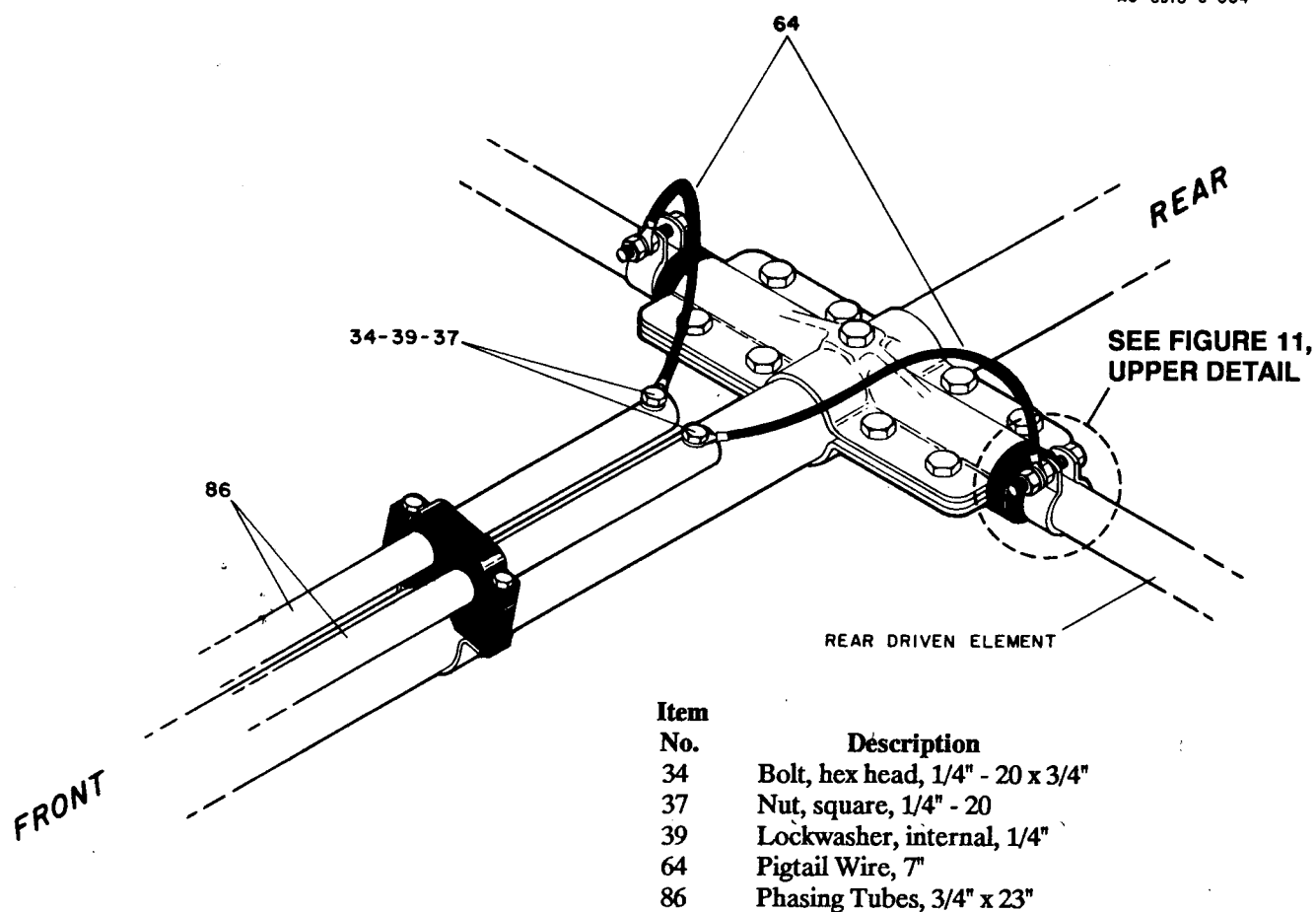


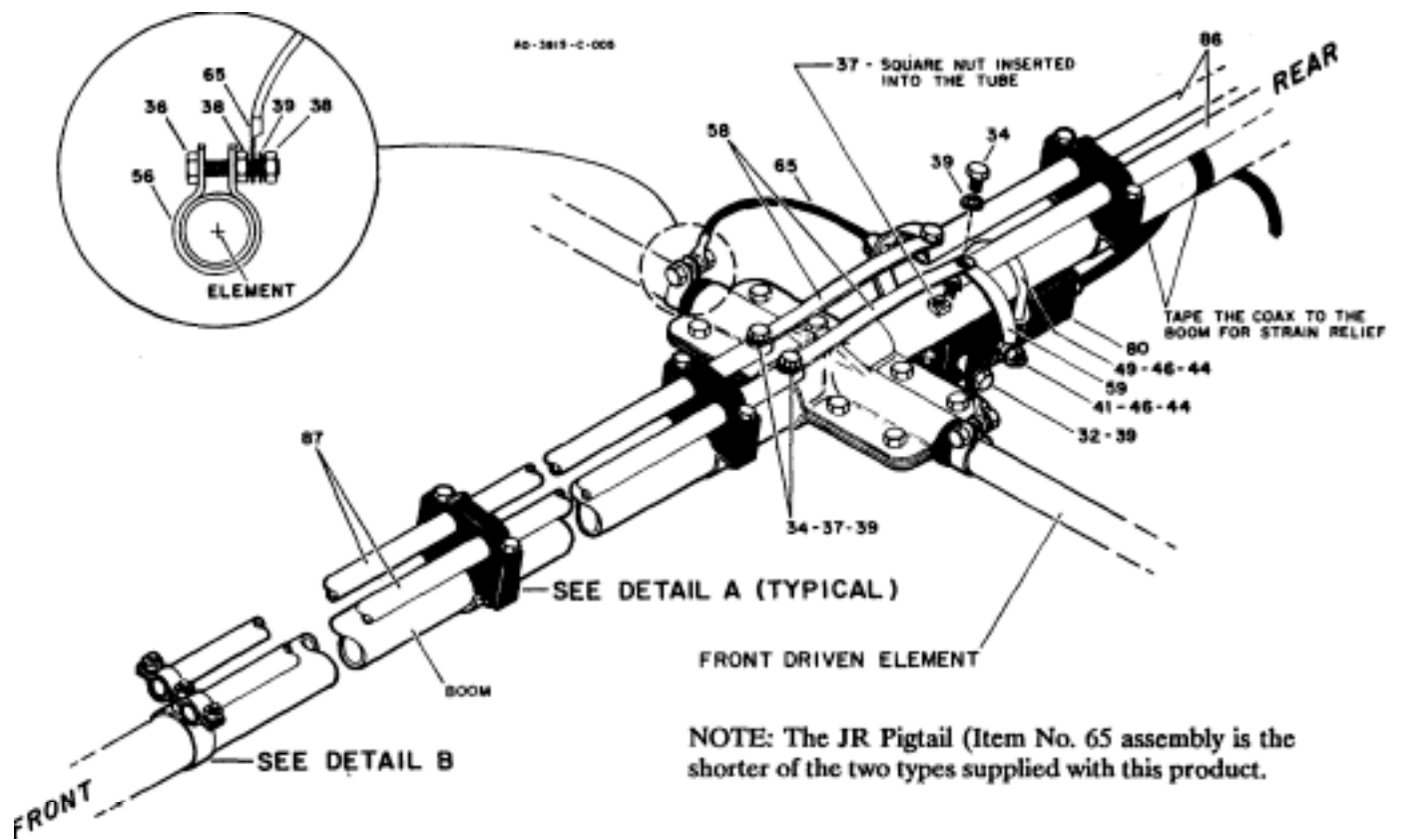
Figure 10
Pigtail Assembly to Rear Driven Element

Beta Match Assembly

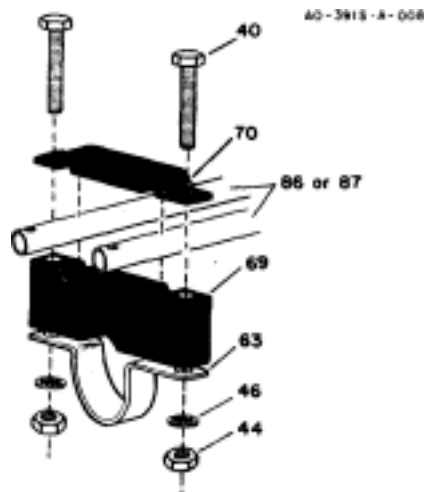
Select the two (2) beta match tubes (3/4" x 70"), two (2) beta support clamps, two (2) beta support insulators, two (2) beta top insulators, and associated hardware and clamps, as shown in Figure 11 and Details A and B. Assemble the beta match tubes and shorting clamp assembly as shown in Figure 11 and Details A and B. The shorting clamp should be flush with the ends of the beta match tubes. The opposite ends of the beta tubes should be approximately 21/2 inches from the center of the FDE bracket. The final dimension will depend on the attachment of the beta tubes and the phasing tubes through the beta feed jumper

Feedpoint Assembly

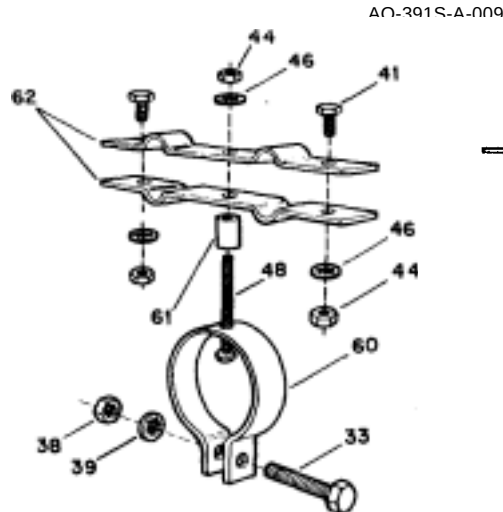
Select the beta feed jumper straps, feed straps and associated hardware as shown in Figure 11. Assemble the beta feed jumper straps and feed straps to the phasing tubes with two (2) 1/4" - 20 x 3/4" bolts, lockwashers and square nuts (Item Nos. 34, 39 & 37). See Figure 11 and Details A. Tighten these snugly. Slide the beta tube assembly on the boom until the beta feed jumper straps can be attached. Attach the jumper straps to the beta tubes with 1/4" - 20 x 3/4" bolts, lockwashers and square nuts and tighten all bolts to hold the beta tubes in place.



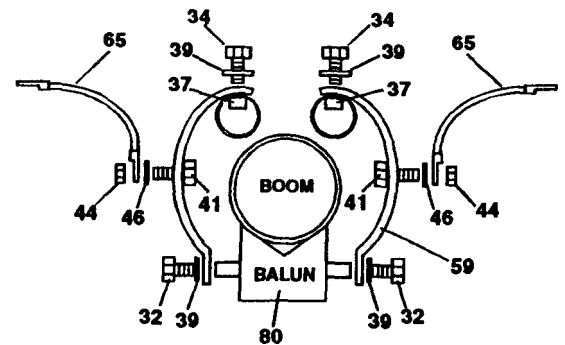
Item No	Description	Item No	Description	Item No	Description
32	Bolt, 1/4" - 20 x 3/8", hex	44	Nut, #10-14, hex	62	Strap, Beta Shorting, 3/8"
33	Bolt, 1/4" - 20 x 11/2",	46	Lockwasher, internal, #10	63	Clamp, Beta Support
34	Bolt, 1/4" - 20 x 3/4", hex	48	Bolt, #10-24 x 11/2", hex	65	Pigtail Wire, Jr., 61/2"
36	Bolt, 1/4" - 20 x 11/4",	49	U-Bolt, #10-24 x 21/2" x 2 3/4"	69	Insulator, Beta Supt. (Bottom)
37	Nut, square, 1/4r - 20	56	Clamp Tubing, 11/4"	70	Insulator, Beta Support (Top)
38	Nut, IN - 20, hex	58	Beta Feed Jumper, TH7DX	80	Balun, BN-86,50 ohm
39	Lockwasher, internal,	59	Feed Strap, TH7DX	86	Phasing Tubes, 3/4" x 23"
40	Bolt, #10-24 x 2", hex	60	Strap, Boom-to-Beta, 2" I.D.	87	Beta Tubes, 3/4" x 70"
41	Bolt, #10-24 x 1/2", hex	61	Sleeve, Beta Shorting		



DETAIL A BETA SUPPORT
CLAMPS AND INSULATOR
ASSEMBLY



DETAIL B BETA SHORTING CLAMP
ASSEMBLY



DETAIL C
BALUN CONNECTION - END

**Figure 11 Pigtail to Balun Connection and Front
Driven Element**

Select the JR (6 1/2") pigtail assembly wires, 1 1/4" tubing clamps and associated hardware as shown in Figure 11. Expand the 1 1/4" clamps slightly and slip onto the 1 1/4" tubing near the FDE insulators. Position the tubing clamps flush with the insulators and secure to the tubing using 1/4" - 20 x 11/4" bolts, lockwashers and nuts (Item Nos. 36,39 & 38). Slip one end of a pigtail assembly over each 1 1/4" bolt and secure using another lockwasher and nut. Route the pigtail up and over to the feed strap. Secure the pigtail wires to the feed strap using #10-24 x 1/2" bolts, lockwashers and nuts (Item Nos. 41, 46 & 44).

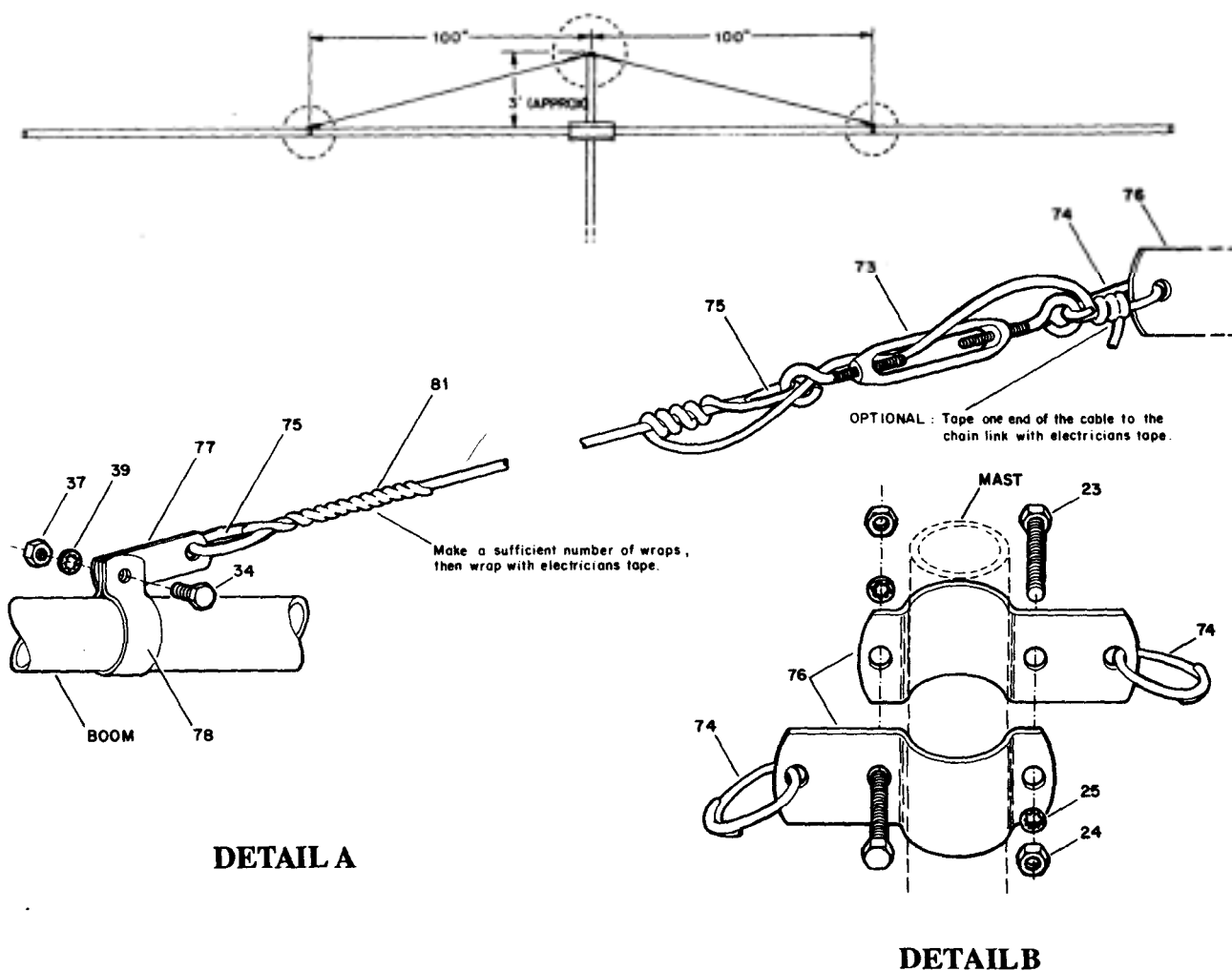
Attach the BN-86 balun to the boom, as shown in Figure 11, using the U-bolt and #10-24 nuts and lockwashers. The balun will be tipped to one side in order to line up with both feed straps. Attach both feed straps to the balun using 1/4" - 20 x 3/8" and lockwashers. Tighten all bolts securely.

Boom Support

Select the 2" I.D. boom support clamps (Item No. 78) and the boom support straps (Item No. 77) and assemble on the boom 100" from the center of the boom-to-mast clamp as shown in Figure 12. Tighten the bolts securely.

Select the 20 foot boom support cable and cut into two equal lengths with a large pair of wire cutters. Attach one end of each cable to the boom support straps using the thimbles (Item No. 75) provided. See Figure 12. Attach turnbuckles (Item NO. 73) to the opposite ends of the cable as shown.

Measure the length of the assembled support cable and turnbuckle for each side. The lengths should be within + \ -1/2". Allow approximately 10-12 inches of wire to tie off the turnbuckle late, as shown in Figure 12. Attach the chain link (Item No. 74) and mast strap (Item No. 76) to each turnbuckle as shown. Install the 3/8" x 2" bolt, lockwasher and nut in each half so that they will be available after the antenna has been hoisted to the top of the tower. Also, tighten the turnbuckle so it will not vibrate loose. Route both cables above all elements and tape near the boom-to-mast bracket so they can be reached after the antenna has been mounted on the tower.



Item No.	Description	
23	Bolt, hex head, 3/8" -16 x 2"	
24	Nut, hex, 3/8" -16	
25	Lockwasher, internal, 3/8"	
34	Bolt, hex head, 1/4" - 20 x 3/4"	
37	Nut, square, 1/4" - 20	
39	Lockwasher, internal, 1/4"	

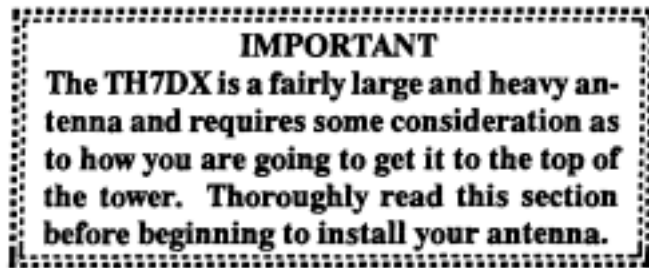
Item No.	Description	
74	Chain Link, open end, 3/16"	
75	Thimble, Wire Rope, 5/32", ss	
76	Mast Clamp, Boom Support, 15/8" I.D.	
77	Strap, Boom Support, ss	
78	Boom Clamp, Boom Support, 2" I.D., ss	
81	Cable, Boom Support, 1/8" x 20'	

Figure 12 Boom Support Assembly

CHAPTER 4

Installation

Make sure all element tubing clamps and anchor bolts are securely tightened. Also, make sure all beta match and phasing tube hardware are tightened securely and free of corrosion. Ensure that all trap drain holes are facing the ground.



Installation On a Crank-Up Tower

WARNING

Installation of this product near power lines is dangerous. For your safety follow the instructions.

Crank the tower completely or as low as it will go and block all sections from moving by using a 2" x 4" piece of wood or a solid iron bar for heavier towers. The block should be inserted through the lattice structure before the tower is completely down, then the tower can be cranked down until the block takes the weight off of the winch.

Use a ladder to reach the top of the tower. NEVER CLIMB THE LATTICE STRUCTURE OF ANY CRANK-UP TOWER!! Attach the mast to the tower and rotator. (The cast aluminum boom-to-mast brackets should be installed on the mast as shown in Figure 1. See Chapter 3.) Attach a gin pole to the tower to assist in lifting the TH7DX.

Attach the lifting rope to the balance point of the antenna. Be careful not to damage the phasing line assembly next to the boom-to-mast clamp. The lifting rope should be fed through the gin pole or other pulley arrangement attached to the tower. The other end should be at ground level, available to the ground crew for lifting. Guide ropes may be loosely looped over the boom ends and used by the ground crew to guide the antenna away from the tower and ladder. The guide rope's two loose ends should be held by the ground crew, so that the guide rope can be retrieved. See Figure 13.

Attaching the Antenna to the

When the antenna reaches the mast bracket, the two 5" bolts should be inserted through the top two holes in the mast bracket and secured using 5/16" - 18 lockwashers and nuts. The other two remaining 5/16" - 18 x 5" bolts should now be installed and secured with the same lockwashers and nuts. Tighten all bolts securely. You may wish to use a deep-well socket set to tighten these bolts. The bolt heads must be on the same side of the boom-to-mast brackets as the phasing tubes. See

The boom support cables may now be untaped from the boom and attached to the mast. Loosen the turnbuckles and slide the entire assembly up the mast until the boom support wires are straight. Tighten the 3/8" - 16 x 2" bolts securely. Take up any slack in each wire with the turnbuckles, until the boom is level. When taut, tie off the turnbuckles as shown in

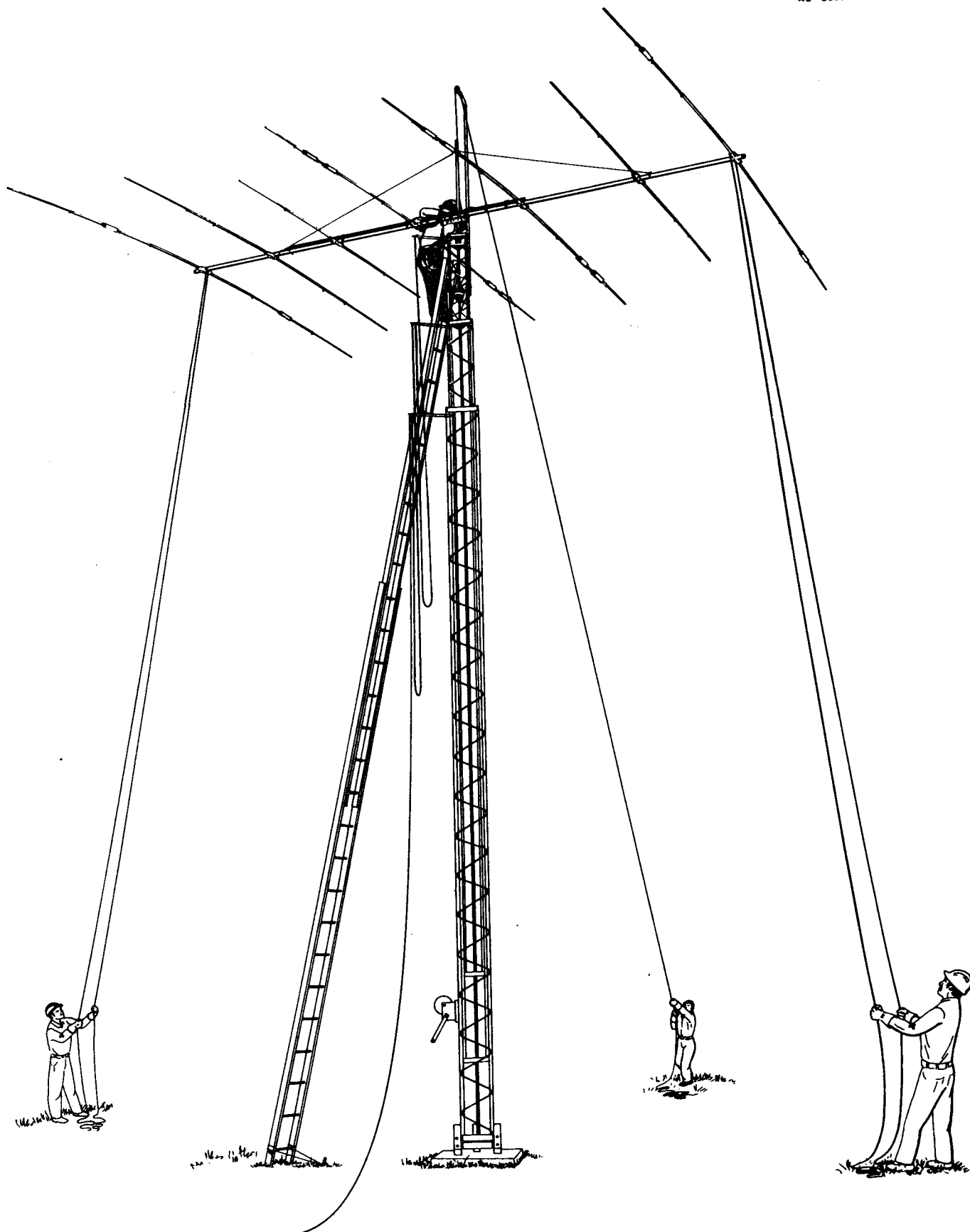


Figure 13
Raising Antenna to Top of Tower

Other Types of Towers

When installing the TH7DX on a guyed tower, you may wish to use a different guide system. If you have insulators on your guy wires, you will need to keep the antenna away from the guy wires as well as the tower. You may wish to use two ropes attached together at the top of the tower and attached to the ground about 15 feet apart. These two ropes can then be used to slide the antenna on as it is also being lifted. The two ropes will need to be far enough from the tower base to allow

Lightning Protection

For proper lightning protection, you must ground your antenna supporting structure. Grounding will ensure noise free operation and low VSWR. A proper ground consists of a 1/2" x 8' copper clad steel ground rod driven into the ground approximately 12 inches away from the concrete tower base. Connect the tower to the ground rod using #8 copper wire and commercial non-corrosive ground clamps.

Attachment of Feedline

Use a good quality 50 ohm coaxial transmission line such as Time RG-213/u (solid), Belden 8237, 8367 or 9251 (solid). Take extra care when soldering connectors to foam dielectric coaxial cable. Weatherproof all connectors which will be exposed to rain or ice. with Coax-Seal® or another similar

Attach the transmission line to the BN-86 balun and tighten the connector securely. Tape the coax to the boom and mast to ensure good strain relief.

VSWR Curves

These VSWR Curves are typical for the antenna mounted 70 feet above the ground, horizontally polarized. Similar curves can be expected for this antenna mounted between 30 and 100 feet above the ground. DO NOT TRY TO TUNE THIS ANTENNA FOR LOW VSWR AT GROUND LEVEL. Higher VSWR can be expected if mounted at less than 30 feet or above a roof or large metallic structure. Forty (40) and eighty (80) meter wire dipoles should be kept at least 6 feet below this antenna. Guy wires should be broken up into non-resonant lengths (less than 12 foot lengths) and insulated from the tower if mounted within 10 feet of the top of the tower.

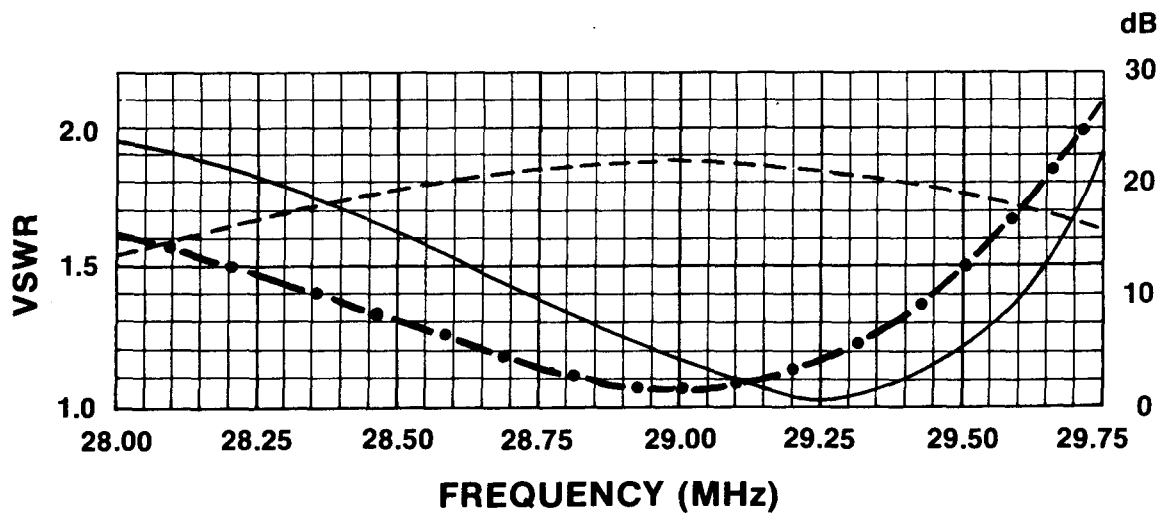
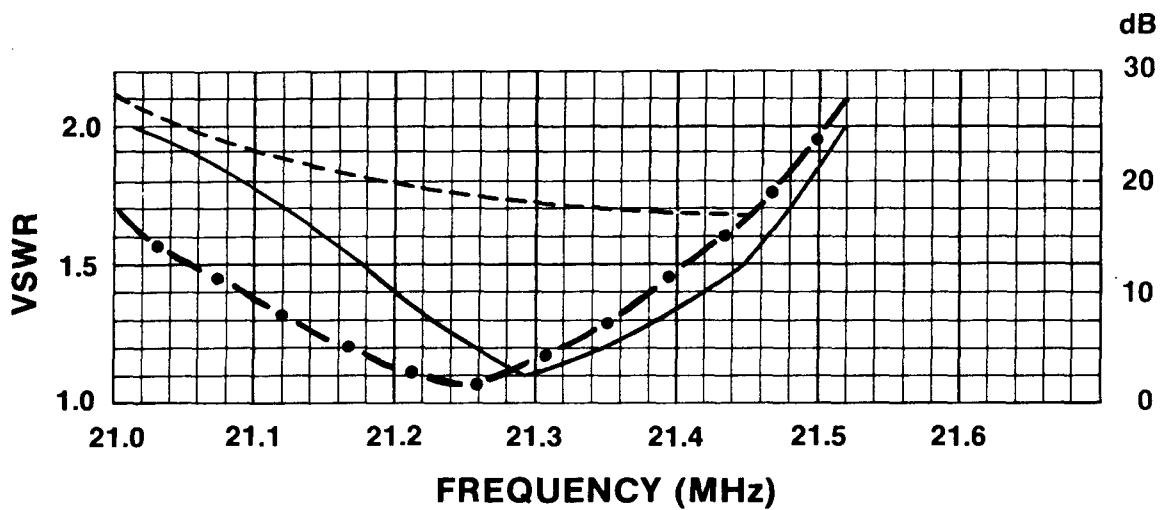
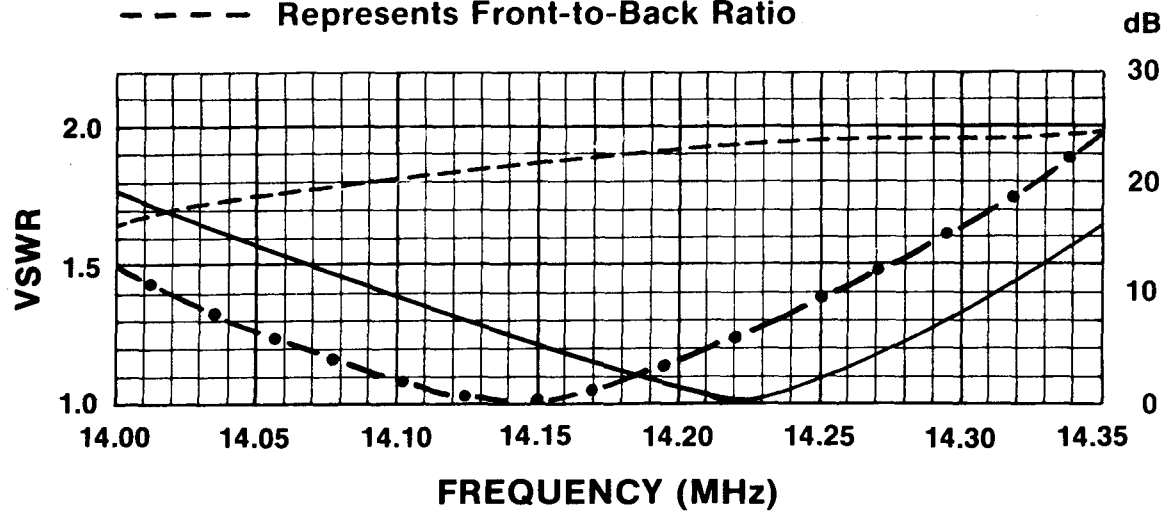
CoaxSeal® is a registered trademark of Universal Electronics, Inc.

• — • — Represents VSWR (DX Setting)

AO-0391-B-006

— — — Represents VSWR

- - - - Represents Front-to-Back Ratio



VSWR/Front-to-Back Charts

CHAPTER 24

Operation

Connect the other end of your transmission line to a good quality SWR meter and then to your radio. While using low power (less than 200 watts output), check the VSWR across each band from 14.0 to 29.7 MHz. Record this information for future reference. See Table 1. Check the VSWR periodically to ensure proper operation.

The front-to-back ratio may be checked by using a steady carrier transmitted by a local station (at least a 1/2 mile away). The front-to-back ratio may be affected by the proximity of metallic structures or guy wires less than 10 feet below the antenna.

This completes your installation of the TH7DX. Happy DX'ing!

VSWR

Type of VSWR

Date Date Frequency VSWR

Date Date VSWR VSWR

VSWR

14.00

14.10

14.20

14.30

14.35

21.00

21.10

21.20

21.30

21.40

21.45

28.00

28.25

28.50

28.75

29.00

29.50

29.70

Table 1

Maintenance

The TH7DX antenna is designed to be relatively maintenance free for most environments. All hardware, is made of passivated stainless steel, typically grade 304. The internal tooth-type lockwashers used in this antenna are grade 410 stainless steel, and are slightly magnetic. The element tubing clamps are grade 304 stainless *steel*. Most other metallic parts are aluminum. All insulators exposed to sunlight are made from U.V. resistant black polyethylene or black Cyclocac®.

If this antenna is installed in corrosive environments, such as within ten miles of salt water, or in industrial areas with smog, several things may be done to prolong the life of this product.

Hy-Gain now supplies genuine Penetrox®A-3 from Burndy Corporation for use as an anti-electrolytic compound within element tubing assemblies. This prevents aluminum oxide from forming on the aluminum surface, thereby maintaining high electrical conductivity between element sections, especially in coastal environments.

Cut the cap off the tube of Penetrox®A-3. Have some rags available to clean off excess from tubing and hands. Be careful not to get this on your clothing.

Before assembling the tubing sections, abrade the mating surfaces with a wire brush or sandpaper. Apply the anti-oxident to both surfaces, then assemble joint. Wipe off any access material.

A light amount of clear lacquer or an acrylic spray may be used to coat the exterior surface of the element assemblies if heavy oxidation is likely to occur. Do not use any coating on trap assemblies.

If installed near a sea coast, the solder lugs on the pigtail wires should not touch the aluminum tube or clamp directly. Each solder lug should be between 2 stainless steel flatwashers. Tighten these connections securely and completely coat with Scotchkote® or RTV.

The internal tooth lockwashers should be replaced with split lockwashers of grade 304 or better stainless steel if your installation is near a sea coast. Otherwise, these lockwashers should be coated with Scotchkote® or RTV.

NOTE: Only use alcohol-based RTV (non-corrosive).

When storing this antenna (or if awaiting installation), care should be taken not to damage any trap assembly or allow any dirt or insects to enter any trap assembly. Do not leave the elements in a grassy area, as wet grass will stain the aluminum.

14Y-Gam' manufactures a high-power current-type balun, model BN-4000B for beams. It will handle 2000 *watts* continuous duty RTTY, SSB, AM, or 4000 *Watts*! PEP, and is completely waterproof: You can obtain this balun from your nearest Hy-Gain dealer.

Cyclocac® is a registered trademark of Borg-Warner Chemical, Inc.
Penetrox® is a registered trademark of the Burndy Corporation.
Skotchkote® is a registered trademark of 3M

CHAPTER 26

Service Information

If you are unable to resolve your problem or if you for need to order replacement parts, you should contact Gain Customer Service Department.

All requests, inquires, warranty claims, or ordering replacement parts, contact: the Hy-

Hy-Gain

You should fully research your problem by going

308 Industrial Park Road

through the Troubleshooting Guides in Chapter 6

Starkville, Mississippi 39759

before you contact the Customer Service

You should retain your sales receipt or other proof of purchase for antennas that are still under warranty.

NOTES:

Parts Identification Information

Item Numbers 1 thru 17 indicate the aluminum: tubes and tubing assemblies used as elements on the TH7DX. The description lists the outside diameter (O:D) of the tube and the total length, of the 'tube in' inches.

Item Numbers 18' thru 21 indicate the factory pretuned traps used on the TH7DX. The Part Number and type of trap, is printed on each part.

The *hardware packs* are divided into smaller packs, most containing only one size of hardware:

The size of the hardware is determined by the outside diameter (OD.) of the threads, e.g. 3/8", 5/16", 1/4", and #10. In the description the thread size is followed by the threads-per-inch and bolt length.

To identify the size of the element compression clamps, please refer to Figure 4, 'page 8.

To identify the straps, please refer to Figures 9-, 12,, pages 14-18.

To identify the *insulators*, please refer to Figures 3 and 11.

Converting American Measurements to Metric

Use this scale to identify lengths of bolts, diameters of tubes, etc.. The American inch (1") and foot (1') can be converted to centimeters in this way.

$$1 \text{ inch (1")} = 2.54 \text{ cm}$$

$$1 \text{ foot (1')} = 30.48$$

$$\text{Example: } 42" \times 2.54 = 106.7$$



Bolt And Nut

To determine proper bolt diameter, place thread end of bolt over black circle. Repeat for nut.

AO-391S-A-



3/8 "



5/16 "



1/4 "



#10

PARTS LIST

NOTE: Item numbers may not necessarily be in numerical sequence and may appear more than one time, depending on how often a part is used, or identical parts being placed in different parts packs.

Item No.	Part No.	Description Qty
1	871098	Tubing Assembly, aluminum, R 1,1 1/4" x 83 ..
2	190303	Tube, aluminum, R2,1 1/8" x 52 ..
3	171153	Tube, aluminum, R3 & RDE-4, 7/16" x 37 ..
4	190206	Tube, aluminum, R2-1 & D2-1, 7/8" x 55.....4
5	190006	Tube, aluminum, R2-2 & D2-2, 5/8" x 26..... 4
6	175512	Tube, aluminum, R2-3, 7/16" x 42 3/4..... 2
7	190900	Tubing Assembly, aluminum, RDE-1 & D3-1, 1 1/4" x 48.....4
8	190311	Tube, aluminum, RDE-2, 1 1/8" x 36..... 2
9	190603	Tube, aluminum, RDE-3, 1" x 8.....2
10	190908	Tube, aluminum, FDE-1, 1 1/4" x 35.....2
11	190300	Tubing Assembly, aluminum, FDE-2, 1 1/8" x 48 2
12	190606	Tube, aluminum, FDE-3, 1" x 6" 2
13	178558	Tube, aluminum, FDE-4, 7/16" x 28....., 2
14	174861	Tube, aluminum, DI, 7/8" x 53".....2
15	174865	Tube, aluminum, D2, 7/16" x 48..... 2
16	175165	Tube, aluminum, D2-3 & D3-3,7/16" x 52••..... 4
17	190312	Tube, aluminum, D3-2,1 1/8" x 317/8"..... 2
18	878694	Trap, 15-meter.....2
19	878749	Trap, 10-meter.....4
20	878637	Trap, 15-meter, driven element.....4
21	872095	Trap, 10-meter, director.....2
22	464723	Trap cap (used on all traps) 2 per trap
	872199	Parts Pack TH7DX, 3/8" & 5/16" Hardware, Stainless Steel1
23	500152	Bolt, hex head, 3/8" - 16 x 2•..... 2
24	555694	Nut, hex, 3/8"-16.....2
25	565696	Lockwasher, internal, 3/8" 2
26	500349	Bolt, hex head, 5/16" - 18 x 5•..... 4
27	500392	Bolt, hex head, 5/16"-18 x 3..... 2
28	506968	Bolt, hex head, 5/16" - 18 x 2 3/4".....2
29	555747	Nut, hex, 5/16"-18.....9
30	5142400	Bolt, 5/16-18 x 3 3/4" hex head 1
31	564792	Lockwasher, split, 5/16.....13
	872200-1	Parts Pack TH7DX,1/4" Hardware, Stainless Steel1
32	500156	Bolt, hex head, 1/4" - 20 x 3/8.....18
33	504098	Bolt, hex head, 1/4" -20 x 1 lt21
34	505266	Bolt, hex head, 1/4" - 20 x 3/4..... 74
35	505734	Bolt, hex head, 1/4" "
36	506518	Bolt, hex head, 1/4" - 20 x 11/4:..... 4
37	551367	Nut, square, 1/4" - 20 24

Item No	Part No.	Parts List (Continued)	Description_ . _ Qty
	872200-1	Parts Pack TH7DX, 1/4" Hardware, Stainless Steel (Continued)	
38	554099	Nut, hex, 1/4" - 20:::.....:::.....	75
39	562961	Lockwasher, internal, 1/4"	105
	872201-1	Parts Pack TH7DX, #10 Hardware, Stainless Steel	
40	500157	Bolt, hex head, #10 - 24 x 2.....	12
41	500158	Bolt, hex head, #10 - 24 x 1/2"	9
42		(Not Used)	
43		(Not Used)	
44	554071	Nut, hex, #10 -24....._....._.....	26
45	(Not Used)		
46	565697	Lockwasher, internal, #10.....	30
48	500159	Bolt, hex head, #10-24 x 1 1/2"	1
49	540087	U-Bolt, #10-24 x 2 1/2" x'2 3/4.....	1
	878199	Parts Pack TH7DX, Compression Clamps	
5		(Not Used)	
5	358756	Clamp, Tubing No. 6 _:::....._.....	18
2	358757	Clamp, Tubing Nt. 10	
5	358758	Clamp, Tubing, No. 16....;	
3	871889	Parts Pack TH7DX, Straps	
56 57	168695	Clamp, Tubing, 1/4"	4
58 59	170452	Crossover Strap, TH7DX	2
60 61	170453	Beta Feed Jumper, TH7DX.....'_...2	
62	170454	Feed Strap, TH7DX....._.....2	
	171077	Strap, Boom-to-Beta, 2" I.D.....	1
	171131	Sleeve, Beta Shorting_.....1	
	171162	Strap, Beta Shb' ng, 3/8" radius	2
	177588		
65	878561	Pigtail Wire. 7"	2
	871890	Pigtail Wire,- Jr. 6 1/2"	2
		Parts Pack TH7DX, Insulators	
67	455625	Caplug, 2..._.....:.....	2
68	455644	Caplug, 7/16"	1.4
69	465595	Insulator, Beta Support (Bottom)	6
70	465600		
71	465833	Insulator, Driven -Element...._.....:.....	4
	871886	Parts Pack, Boom Support.....	
73	351243	Turnbuckle, 7/32" x 2"	2
74	351244	Chain Link, open end, 3/16"	2
75	358731	Thimble, Wire Rope, 5/32", ss	4
76	381100	Mast Clamp, Boom Support, 1 5/8" I.D.....	2
77	378216	Strap, Boom Support, ss....._.....	2
78	378208	Boom Clamp, Boom Support, 2" I.D, ss.	2

Parts List (Continued)

Item

No.	Part No.	Description	Qty
79	872098	Tube, Boom, 2" x 79 1/2"	
80	873424	Balun, BN-86, 50	
81	691081	Cable, Boom Support, 1/8" x 20'	
82	102734	Mast Bracket, cast	
83	163764	Bracket, Element-to-Boom, #4.....	6
84	165919	Bracket, Element-to-Boom, #13.....	4
85	165920	Bracket, Element-to-Boom, #14.....	4
86	170447	Phasing Tubes, 3/4" x 23"	
87	170456	Beta Tubes, 3/4" x 70"	
88	171166	Tube, Boom, 2" x 69 1/2"	
89	172732	Clamp, Boom-to-	
90	172735	Bracket, Casting-to-	
50	691138	Rope, polyethylene, 5/32" x 12'	
91	850050	Coax-Seal®	
92	850091	Penetrox®A-3	

Penetrox® is a registered trademark of the Bumdy Corporation.

Coax-Seal® is a registered trademark of Universal Electronics.

hy-gains LIMITED WARRANTY

by gain Warrants to the original owner of this product, if manufactured by *by gain* and purchased from an authorized dealer or directly from *hygain* to be free from defects in material and workmanship for a period of 12 months for rotator products and 24 months for antenna products from date of purchase provided the following terms of this warranty are satisfied.

1. The purchaser must retain the dated proof-of-purchase (bill of sale, canceled check, credit card or money order receipt, etc.) describing the product to establish the validity of the warranty claim and submit the original or machine reproduction of such proof-of-purchase to *hygain* at the time of warranty service. *hygain* shall have the discretion to deny warranty without dated proof-of-purchase. Any evidence of alteration, erasure, or forgery shall be cause to void any and all warranty terms immediately.

2. *hygain* agrees to repair or replace at *hygain's* option without charge to the original owner any defective product under warranty, provided the product is returned postage prepaid to *hygain* with a personal check, cashiers check, or money order for \$8.00 covering postage and handling.

3. Under no circumstances is *hygain* liable for consequential damages to person or property by the use of any *hygain* products.

4. Out-of-warranty Service: *hygain will* repair any out-of-warranty product provided the unit is shipped prepaid. All repaired units will be shipped COD to the owner. Repair charges will be added to the COD fee unless other arrangements are

5. This warranty is given in lieu of any other warranty expressed or implied.

6. *hygain* reserves the right to make changes or improvements in design or manufacture without incurring any obligation to install such changes upon any of the products previously manufactured.

7. All *hygain* products to be serviced in-warranty or out-of-warranty should addressed to *hygain*, 308 Industrial Park Road, Starkville, Mississippi 39759, USA and must be accompanied by a letter describing the problem in detail along with a copy of your dated proof-of-purchase.

8. This warranty gives you specific rights, and you may also have other rights which vary from state to state.